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and east the steppes towards the Caspian and the 133
Kuma-Manych depression are barren and stony or sandy.

Coasts

The coast of Ciscaucasia is flat, and the only ports [504]
worth noting are Anapa, Temryuk, and Yeisk. The Ciscaucasian shores of the Caspian Sea are surrounded by steppes and are flat throughout. They are formed chiefly of the alluvial land of the deltas of the rivers Terek and Kuma.

River System

The rivers of Ciscaucasia rise in the central Caucasus. There are three river basins, corresponding with the three administrative divisions.

The River *Kuban* rises on the northern side of Mount Elbruz. It is formed by the Khursuk and the Uchkulan, which unite at Uchkulan. It retains its character as a mountain stream until it enters the plain at Batalpashinsk, at a height of 1,075 ft. The middle course extends from the Cossack settlement of Nevinnomysk as far as Ekaterinodar. The river bed is wide, but the river itself is a mere streamlet except in times of flood. After the Kuban turns definitely westward the fall is only about 20 inches in a mile.

The largest tributary of the Kuban is the Laba [312]
(200 miles), a canal from which at Chamlik irrigates several thousand acres of steppe land. Another large tributary is the Byelaya (150 miles). The Kuban flows by many mouths, forming several islands and *limans* (marshy lagoons), into the Gulf of Kyzyltash. The river is frozen from December to March. In the lower part of its course inundations are frequent, and the district is marshy.

The *Terek* (382 miles) rises on the slopes of Mount Kazbek at Zilga-Khokh, and pierces the mountain range by the Dariel gorge, which it leaves at Vladikav-

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Caucasus, in 1913 there were 803. Agricultural methods were taught in some of the industrial schools. There were experimental botanical gardens, subsidized by the State, at Tiflis and Batum, and a sericultural station. The grants made by the Caucasian Board of Agriculture for the promotion of rural industries in 1913 amounted to £100,000, an advance of 50 per cent. on the sum granted in the previous year. Of this total £61,000 was allocated to research, £2,000 to improvement of live-stock, and £5,000 to grants in aid to agricultural societies.

In 1913 a commission of agriculturists appointed by the Viceroy of the Caucasus recommended that all educational and experimental institutions should be brought under the Board of Agriculture, and that a permanent commission should be formed to control and initiate such institutions, to organize the supply of information, and to compile statistics.

Partly on account of labour difficulties (see p. 50) there was an increasing demand for agricultural machinery, but better methods of cultivation were simultaneously being introduced.

Extensive *irrigation* schemes had been carried out and others were in contemplation. At Chamlik, a canal from the Laba, the largest tributary of the Kuban, irrigates several thousand acres of steppe land. There is an irrigation canal near Tiflis. In 1906, 62,100 acres of land in the Mughan steppe were reclaimed, at a cost to the State of £31,000; 14 villages were planted, and land which had been practically worthless yielded about £4 an acre. In 1913 the Irrigation Board set up a modulation section to test the rise and fall of water for irrigation purposes in the Karayaz experimental fields and the Mughan steppe. The irrigation of the Mughan steppe was completed and the adjoining Mil steppe was made fertile by means of the Romanov Irrigation Canal, which was opened in 1914; in this year a large barrage was under construction at Saalti, and was to have been completed by 1915. A total of 190,000 acres on the Mughan had been reclaimed,

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and 20,000 settlers planted. These improvements had cost £425,000 up to 1914. The water for irrigation was to be obtained chiefly by controlling the rivers Aras and Kura, which in their lower reaches overflow their banks and form permanent marshes. The question of the regulation of all the principal rivers of the country was being officially studied.

(c) *Forestry*

The total area of forest land in Caucasia cannot be stated with certainty. The extent of the forests under the control of the Ministry of Forests was 12,218,000 acres, or about 11 per cent. of the total area of the country and rather more than half of its cultivated area. Kasperowicz[1] puts the total at 16,000,000 acres, and specifies as being favourably situated for commercial exploitation, 1,372,000 acres in Tiflis and Zakatali, 1,008,000 in Elisavetopol, 863,000 in Chernomoria, 807,000 in Kuban, 705,000 in Terek, 647,000 in Batum, 453,000 in Kutais, and 417,000 in Sukhum. The largest tracts of virgin forest are to be found on the mountain slopes of the Black Sea coast; there is a large forest north of Lake Gokcha, and another in the east of Elisavetopol Government; the middle course of the Kura is wooded throughout, and there are considerable forests in the Armenian Highlands. The best exploited forests in Transcaucasia are those in the Ateni valley near Gori, in the Adzhamer valley near Rion, and at Borzhom—all to the west of Tiflis or the east of Kutais.

The trees include walnut, box, beech, oak, birch, Caucasus palm, wych-elm, pine, alder, &c., of which the first five are the most valuable. The walnut and box tree grow extensively in Transcaucasia; their timber formed a valuable article of export, but the quantities exported are declining, since the remaining walnut forests are remote from railways, and the boxwood is being held back to await more favourable

[1] Raffalovich, *Russia: its Trade and Commerce*, p. 94.

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and at Delijan, Kazakh, Sagali, Saifalu, and elsewhere in the Government of Elisavetpol.

(2) In the Chorokh Basin, the whole length of which is believed to contain rich deposits of ore, the British Caucasus Copper Co. has worked the Dzanzul mine, south of Borchka. In 1912 the production from this mine was 40,000 tons of ore and 3,000 tons of copper, but in the following year the output was disappointing. In the same region Siemens Brothers had begun operations at the Khvartshana mine.

(3) In the Zangezur region difficulties of transport have prevented adequate exploitation, but work has been undertaken by native firms, notably at Synik, Barabatum and Katar. Other considerable deposits are believed to exist in the Rion Valley round Telav and Zakatali, in the Sukhum district and along the Ossetian Military Road.

Iron has been little exploited in the Caucasus, but deposits have been prospected at Khamuli in Kutais, Chachak in Tiflis, on the banks of the Bzib near Sukhum, at Veden in Chechnia, in the Maikop district, and near Lenkoran.

There are deposits of *lead* and *zinc* ore at Sadon, near Vladikavkaz, in the neighbourhoods of Sukhum and Gori, in the Government of Elisavetpol, near Mozdok and Artvin, and elsewhere, but little exploitation has been undertaken. Deposits of *mercury*, *molybdenum*, *antimony*, *iron pyrites*, *cobalt* and *nickel*, and also small quantities of *gold* and *silver* exist, and would probably repay exploitation.

Non-Metals.—*Coal* is exploited in the Caucasus only at the mines of Tkhvibuli in the Government of Kutais, where the annual production for 1911–15 averaged about 5,000 tons. Much of it however was of poor quality. Rich deposits have been prospected at Tkvartcheli, in the Government of Sukhum, and another field has been located near Olti in the Government of Kars.

Deposits of *baryta* have been worked in the Government of Kutais; *asbestos* is produced at Shorapan and elsewhere in Kutais; *sulphur* abounds in the Government of Erivan; *salt* is produced in considerable quantities in the Governments of Baku, Erivan, Kars, and Daghestan; there are *bitumen*-beds on the Black Sea coast; *emery* is found at Kara-Bulakh; fine *lithographic stone* is obtainable at Amlivi, near Tiflis, and *pumice-stone* near Kars; *mica* and *graphite* also exist.

Mineral Springs.—The Caucasus is celebrated for its mineral springs, and before the Revolution many thousands of Russians, and even invalids from Western Europe, visited the health-

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giving waters. In the Northern Caucasus Essentuki, Piatigorsk, Kislovodsk and Zhelesnovodsk were the favourite resorts. In Transcaucasia Borjom, in the Government of Tiflis, an appanage of the Grand Duke Nicholas Nicholaevich, was the most popular resort, and its waters, rich in carbonic acid and comparable with those of Vichy, were exported to Russia, Western Europe and America—in 1913 to the amount of 9,000,000 bottles.

At Abas-Tuman, 40 miles from Borjom, and at Tiflis are hot baths, efficacious for the cure of skin diseases, nervous diseases, rheumatism, etc. Some of the springs contain the same qualities as Cauterets and Barèges in France, and Baden in Austria, while the climate of Abas-Tuman attracts consumptive patients.

Tskhalkubo, near Kutais, possesses warm springs whose radio properties are declared to be equal to those of Teplitz-Schönau in Bohemia. For this resort is prophesied an important future as soon as the nature of the waters is more widely known, and ordered conditions make it accessible to the timid invalids of Western Europe and America.

Petroleum (1) The Baku Fields.—The Baku area has hitherto been the most productive source of Caucasian oil. The older oil-fields lie in the Apsheron Peninsula—Balakhani, Sabunchi, Romani, Bibi-Ebyat and Zabrat—while there is a more recently discovered field at Surakhani. The outlying district of Benagadi and Holy and Cheleken Islands in the Caspian, are also worked by the Baku firms. The Baku fields had been exploited since ancient times, and from 1813 some attempt had been made by the Russians to develop their potentialities. An onerous concession system, however, discouraged private enterprise, and when, in the middle of the nineteenth century, a universal demand for crude-oil was created, the fields still remained almost untouched, and Russia became dependent on oil imported from America. In 1872 the concession system was at last abolished, and State participation in the profits was ensured by the imposition of an excise duty. Later, the nascent industry was further assisted by the imposition of a duty on oil imported into Russia.

In 1873 the Swedish Nobel Brothers commenced to bore in the Apsheron fields, and in the following years many foreign groups, principal of which were the French Rothschilds, obtained concessions. In 1908 the prosperity of the Baku fields reached its zenith, and in that year the Caucasian oil-fields together produced 22 per cent. of the world's output. Between 1908 and 1911, however, there took place a serious decrease, the output falling from nearly 7,500,000 metric tons in 1908 to just over 5,000,000 metric tons in 1911.

*133 Black Sea basin. This line constitutes a watershed between the Caspian and the Black Sea basins, determining the course of the rivers streaming from the Caucasus towards the north into two natural groups: the eastern one constituting the Caspian, the western one the Black Sea drainage system.

Rivers of Dagestan

To the Caspian drainage system belong all the rivers of Dagestan and those of the central Caucasus, which belong to the tributaries of the T'erek. In Dagestan we have, from south to north, the river systems of the Kuba plains, which are numerous little streams named after the inhabited places situated on their banks; for instance, the two larger ones are the Kubinka, on whose bank the city of Kuba is situated, and the Kusar or Kusari-Chai, north of the Kubinka, on which is the town of Kusari, in the northeast foothills of the Caucasus, where this river enters the plain of Kuba. South of Derbent, midway between it and the Kusar, the Samur river, which constitutes the southern frontier of Dagestan and the expansion of the Dagestanian peoples, streams in a huge semi-circle, first to the south and southeast, and then to the east and northeast, to the Caspian Lake.

*133 The uneven distribution of water, either
•312 seasonal or due to insufficiency, found with the many small streams running down to the

*133 plains of Kusari and Kuba in almost parallel
• 312 courses between the estuary of the Samur and the Kyzyl-Burun ("Red Cape"), has now been regulated by the Samur-Divichi Canal. This canal starts from the lower Samur at a point about 30 km. from the coast, and runs in a southeasterly direction, first at an elevation of between 200 and 300 meters above zero; then, at a point about 25 km. east of Kuba, it gradually descends to lower levels. Near the town of Kyzyl-Burun it joins the sea, having a total length of about 110 km. In this way, water of the Samur can be used in the fertile Kusari-Kuba plains at periods when the water supplied by the smaller streams of that area is diminished or even absent. According to most recent information the Samur-Divichi Canal is being extended beyond Kyzyl-Burun to Apsheron, in order to feed a large reservoir in that arid
*133 area (Dr. Theodore Shabad, orally). The Samur has its sources in the High Caucasus between the two main ridges in the area northwest of Mt. Bazar-Düzü and north of Mt. Magi-Dagh. In the close vicinity of the sources of the Samur, the source of a river system of central Dagestan is found, generally called the system of the Koisu (in Turkic "sheep river"), which has a large drainage system from the northern slopes of the Alakhun-Dagh to the eastern slopes of the Diklos-Mt'a. Here four source rivers are distinguished, three of them called Koisu. The eastern one, which has its sources on the northern slope of the Alakhun-Dagh, is the Koisu of Djumakh; the next one to

*133 The third river is the Yegorlyk. It has its sources in the Southern part of the Stavropol' plateau near Mt. Strizhament and the Kuban valley. It receives most of its tributaries from the right, i.e. northwest, slopes of the Stavropol' plateau. It falls into the western Manych between Lake Manych-Gudilo and the water reservoir slightly west of the intersection of
• [312] Manych and 42nd E. meridian. Southwest of the city of Stavropol', a canal has been built connecting the Kuban and the Yegorlyk, making use of the subsidence of the flat range of the plateau between Nadzornyi on the Kuban and Sengileyevskaia on the Yegorlyk.

The drainage systems of the Yegorlyk and Kuban, and another one between these two, belong to that of the Black Sea.

The entire portion north of the Manych, particularly the western part, i.e., west of the low, hilly Yergeni range, whose eastern declivity is relatively steep while the western is very flat and subsides smoothly towards the west, belongs to the drainage system of the lower Don which, for a length of about 200 km. between Kalach in the northeast and Tsymliansk in the southwest, has been converted into an extensive artificial lake called the Tsymliansk Sea. A number of small water courses of this region flow into the Tsymliansk Sea. The only larger one is the Sal, which flows into the Don between the estuaries of the Donets and the Manych. The Sal has two source rivers,

*133 Alazani-Kura confluent, the Kura has almost exclusively right, i.e., southern, tributaries from the northeastern slopes of the Anti-Caucasus. About 20 km. below Tiflis and before the Khrami confluent, the Kura supplies an area of about 130 km. with irrigation water.

South of Tiflis, the tributaries Khrami, Debet, and Akstafa constitute the drainage of the Trans-Caucasian plateaus and of the mountains east of the Djavakhetian range and north of the Sevan; the tributaries flowing south of the above are the drainage system of the northeastern and northern slopes of the Sevan range (Shah-Dagh and Murov-Dagh) and of the northern, higher portion of the plateau of High Karabakh. Among these rivers the Shamkhor-Chai, Ganja-Chai (so called after the famous old Azerbaidjanian cities of Shamkhor and Gandja--now Kirovabad--near or through which they flow), and Terter should be mentioned. As soon as the latter enters the plains near the town of Mir-Bashir, it branches off in several courses which serve as natural irrigation systems. The little rivers streaming down from the northeastern slopes of the outer border range of Karabakh do not reach the Kura or Araxes at present; they are exhausted in the
*133 plains right near the foothills. The southern
•312 rivers are interconnected by a long canal system supplying the area with natural irrigation. This system starts a few minutes north of lat. 40° N., and is drawn in a southeasterly direction towards the Araxes, from which an

*133 additional amount of water is derived, since
•312 the above-mentioned rivers are weak and seasonally dry.

*133 The natural southeast borders of the Kara-Yazy and the Shirak steppes are the valleys of Kura and Alazani. A few kilometers before it empties into the Kura, the Alazani receives the Iori or Iora from the right, i.e. northwest; this river flows through the valley separating the two flat, oblong, hilly ranges of the Kara-Yazy and the Shirak steppes. The Iora has its sources south of the Tebulos-Mt'a massif, and streams down the valley between the K'art'alinian and the Kakhet'ian ranges. On the latitude of Tiflis, it turns southeast and from there on continues in a direction roughly parallel to that of the Kura. In its upper course the Iori has a few small tributaries, but loses them as soon as it runs between the two steppes, i. e., roughly from the latitude of Tiflis on.

The Alazani has its sources on the southern slopes of the southern main range of the Caucasus in the immediate vicinity of the sources of the Andi-Koisu, whose largest source river, south of the Tebulos-Mt'a massif, is likewise called Alazani. Around lat. 42° N. it receives a few small tributaries from the west and southwest, coming from the Kakhet'ian range; where the latter subsides and goes over into the flat, hilly range of the Shirak steppe, the tributaries of the Alazani

#133 come almost exclusively from the southern slopes of the Great Caucasus. The majority of these numerous but short tributaries meet the Alazani at a right angle. The upper part of the Alazani is the country of Kakhet'ia, famous for its excellent wines, such as Napareuli, T'elavi, and Tsinandali. The Alazani streams in a southeasterly direction through a valley situated between the flat elevation of the Shirak steppe and the foothills of the Great Caucasus until it receives the Aghry-Chai (or Agiri-Chai), encountering it from exactly the opposite direction, since in this part of the valley there is a slight acclivity towards the southeast. Thus the Alazani turns in a southward direction through a subsidence in the flat range of the Shirak steppe, so that it unites with the Iori and the main river.

At the point of the Alazani-Iori-Kura confluent, the river is not more than 200 m. above the level of the Caspian Sea, at a straight distance of 300 km. from the estuary; thus, the river on this insignificant declivity has a tendency to form many curves and swamps
•[312] and to change its course. Below the Alazani-Kura confluent near the town of Mingechaur the river has been dammed up into the Mingechaur water reservoir, which is to serve as
[317] a hydroelectric station and was put into operation in 1954. It may also be used for irrigation, as well as river regulation purposes.

*133 the south, the Kyzyl-Chai ("Red River"), streams down from the border mountains between Turkey and Persian Azerbaidjan, northwest and north of the Lake of Urmia, into the Araxes.

There have been epochs, and those during times of human history, when the Araxes had a separate estuary south of that of the Kura in the Gulf of Kyzyl-Aghach. In Stieler's Handatlas a branch of the Araxes is indicated as diverting near the village of Agha-Khanly, where the Persian boundary line retreats from the Araxes river to cut in a southeasterly direction across the Mughan steppe towards the foothills of the Talysh Mountains, as the foothills of the Alburz are called here. This branch empties into a small delta in the Kyzyl-Aghach Gulf. The Russian Atlases of 1954 show this branch, as well as several others, and the upper branches, one of which is found at an elevation between zero and 100 m., the rest of them being within the Caspian Depression, i.e., below zero. Some of the lower branches finally take a northeasterly course and unite with the Kura about 50 km. from the sea. The upper branches have been used for the Azizbekov canal system, which can be considered the southeastern continuation of the Ordzhonikidze Canal and irrigation system situated before the eastern foothills of High Karabakh. This serves for

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the irrigation of the southwestern portion of the Mughan steppe as well as for purposes of river regulation to prevent inundations, swamp formation, and the unnecessary waste of water. Partly as a result of this, the salty lakes of Ak-Chala, as well as the Gulf of Kyzyl-Aghach itself, have shrunk considerably. In the Russian Atlases of 1954 there are two smaller lakes now indicated, a southern one—Mahmūd-Chala—and a northern one, given as Ak-Chala, and no branch of the Araxes is shown as flowing into the Kyzyl-Aghach Gulf. It would seem, moreover, that the Akusha, the old western estuary of the Kura, branching off near the town of Salyany and emptying into the Kyzyl-Aghach Gulf, is now receiving waters from the Bolghar-Chai, draining the northeastern valleys of the Talysh Mountains, and the Azizbekov Canal; and this is mainly being used for the irrigation of the southeastern extremity of the Trans-Caucasian part of the Caspian Depression. As a further consequence of the shrinking of the Kyzyl-Aghach Gulf, the formerly very small island of Sara, about 10 km. long, off the coast a few minutes south of lat. 39° N., is now seen as a long island extending for about 50 km. from south to north, taking up considerable space in the western portion of the former gulf (the new gulf is named after Kirov, Zaliv im. Kirova). This reduction of the Kyzyl-Aghach Gulf is probably not only due to the alluvial deposits of

*133 during the year 1876; at that time, rocks were thrown as far as Cape Alyat [Alet] on lat. 40° N. on the continent. In this region, the water is often disturbed by submarine volcanic activity, just as near the peninsula of Cheleken, on the opposite shore, south-southwest of Krasnovodsk; and now and then [315] the sea is polluted by naphtha. In the northern part of this region, closer to Baku, near the town of Bibi Eybat, a number of oil derricks stand in the sea. At a distance of 45 km. due east of the Shakhova Kosa (in Turkish, Cape Sarsy-Burun), the southernmost tip of Apsheron, a number of shallow naphtha-ejecting areas, the so-called naphtha banks, are situated under water. These are at present the most important oil wells, known as the Neftyanye Kamni.

Mineral Springs

•312 As a rule, volcanic areas are rich in sources of mineral water. One of the areas most abundant in mineral springs of various compositions is found in the Besh-Tau ("Five Mountains") area, north-northeast of the Elbrus massif. The mineral sources in this area are undoubtedly a consequence of the volcanic activity in this region and therefore probably connected with the origin of the famous Lakkoliths, with their liparitic cones. In the region of Mt. Besh-Tau, an almost

● 312 unlimited number of hot springs is found. As early as the first half of the 14th century, the Besh-Tau was visited as a summer resort as well as for medical purposes by Khans and Grandees of the Golden Horde; from the 18th century on it has been attracting Russian visitors. The springs well up from lines of fracture which exhibit an intricate system running across the area in a generally northeast-southwesterly direction, in part also parallel to the axis of the Caucasus system. The temperature of the springs differs according to local conditions. The hottest ones are the natro- and theio-thermal springs of Pyatigorsk, which arise at the foot of Mt. Mashuk at an elevation of 600 m., with a temperature of 45.4° C. At the foot of the Goriachaia gora ("hot mountain") warm sulphur springs are found which have a temperature of 24° C, with a mineral content of 7 °/oo, i.e., 7 g. per liter, and a particularly strong radioactivity (of more than 500 Mach units). The famous and unique Narzan spring (in Kabarda, "spring of the giants") of Kislovodsk, has a maximal content of carbonic acid, and has, as it leaves the soil at an elevation of 920 m, a temperature of only 14°C; while the springs at Yessentuki at an elevation of 650 m, are at 15.6° C. Having

• 312 their origin in different geological strata, these springs do not exhibit any interrelation between absolute elevation and temperature.

Among the springs of Mineral'nye Vody ("mineral waters"), there are three with a temperature above that of the body, two at 45° C. and one at 55° C. Among the northern group of cold springs there is one which has a very high degree of radioactivity. The situation in Pyatigorsk is similar: one of the most powerful springs has a temperature of 42.2° C and a mineralization of 4.34 g per l. of water (4.34‰). Another spring near Mt. Proval has a temperature of 48.5° C and a mineralization of 4.4 g. per l. (i.e., 4.4‰). In addition, there are sulphurous radioactive warm springs.

The springs of Yessentuki are chiefly of two kinds: alkaline springs containing carbonic acid and iron, and magnesium springs containing sulphurous calcium. One of these springs yields a mineralization of 9 g. of dry residue per l., or 9 ‰. The springs of Yessentuki are equivalent in composition and therapeutic value to those of Ems, Vichy, and Karlsbad, but they possess a greater salt content.

The waters of Zheleznovodsk ("iron waters"), situated 14 km. southwest of Mineral'nye Vody, on the northern slope of

312 Mt. Besh-Tau and the southern slope of a lower Lakkolith mountain, the Zheleznaya ("iron one"), spring from the intrusive rocky layers around the Zheleznaya. There are about 20 warm and cold springs, with temperatures ranging from 15.5° to 55° C, of alkaline-salino-tellurian composition, with a considerable content of carbonic acid, whereas their iron content is very small, not exceeding 5 mg. per l. The springs of Zheleznovodsk combine the qualities of those of Karlsbad and Wildungen.

132 Apart from its wealth of mineral waters of the most various types the entire Besh-Tau area possesses an ideal climate. The average temperature is that of Switzerland and the central Alps but the insolation is more vigorous. The area is protected against northern winds and the humidity is low. It is therefore one of the most healthful spots in the world. The Besh-Tau area has a great number of clear days during the year, so that the higher peaks always afford a most magnificent view of Mt. Elbrus and neighboring peaks of the central Caucasus.

312 In the Groznyi area, well known for its oil wells and the corresponding industry, the hot springs of Goriachevodsk — "hot waters" — now Goriacheistochnenskaya — should be mentioned. They are situated at 212 m. above sea level, 15 km. north of Groznyi, near Staryi Yurt. The temperature of the springs approaches the boiling point, being 80° - 81° and 92° - 95° C. The springs contain only a small

312 percentage of sulphur and other minerals. They are very voluminous and are enveloped in clouds of steam as they fall in cascades from an elevation of 30 m. into artificial bathing pools, in which the water remains almost at body temperature. Goriachevodsk belongs to the zone of arid climate. 50 km. west of Groznyi on the railroad, the mineral water area of Sernovodsk ("sulphur waters") and Sleptsovsk (now Ordzhonikidzevskaia) is found. Near Sernovodsk, sulphurous warm springs with an average temperature of 56° C. are located, while the temperature of the Sleptsovsk group is around 30° C. South of these is an area of ferrous springs with a temperature of 28° C., and still farther south, one with cool alkaline springs.

In the vicinity of a naphtha area also are found the hot springs of the northwestern Caucasus. Among them should be mentioned those of Goriachi Klyuch ("hot well"), on the Psekups, on lat. 44° 37' N., in the foothills of the Caucasus. These are hot, sulphurous springs with temperatures ranging from 41-56° C., salt (sodium chloride) springs with a temperature of 18° C., and ferrous springs at 14° C.

About 6 km. east of Sochi on the Black Sea coast, Matsesta is located, famous for its sulphur springs. The waters of these springs are said to be the only ones in the world possessing so high a saturation of sulphurous hydrogen, and to exceed by 100 times the water of the famous ancient sulphurous springs of

• 312 Brusa (in Bithynia, Northwest Anatolia), or those of Aachen (Kaiserquelle). The temperature of the springs is 21.8° to 24.8° C.

Of the mineral springs of Trans-Caucasia, those of Elisu ("fifty waters") on the Kurmukh (or Kara-) Chai River, 30 km. north-northeast of the ancient town of Nukha, may be mentioned here; these are voluminous hot alkaline, sulphurous springs with temperatures from 38°-42° C.

The Talysh Mountains also have their mineral springs. The only ones used so far for medicinal purposes are those of Andja or Andjinsk resp., 12 km. west of Lenkoran. The latter is situated in a most insalubrious, fever-ridden area extending along the Caspian coast. Andja is located just on the borderline between the Tertiary-Tuffogeneous and the Miocene area; the mineral springs are of the same composition as those of Aachen and Pyatigorsk.

Another region rich in mineral waters is Georgia. About 100 springs of differing volume and composition are known in the territory of Georgia. The most remarkable areas are those of Borzhomi, Bakuriani, and Abast'umani, situated on the upper Kura river in the Adjaro-Imeret'ian and T'rialetian ranges. This is an area of exquisite natural beauty and ideal climate. The region of and around Abast'umani, situated on the southern slopes of the Adjaro-Imeret'ian range south of the Zekari Pass,

•312 over which a road leads northward to Kutaisi, is protected against all cold winds and is on the latitude of 41° 40' at an elevation of 1250-1340 m. This region has natural endowments far superior to Davos and other health resorts of Switzerland. Abastumani has three acro-thermal springs; their temperatures are 48.2° C., 43.2° C., and 40° C., for the anti-scrophulosis spring. There are a few sulphurous springs higher in the mountains and near the pass, 4 km. from the village of Zekari.

Borzhomi is situated at an elevation of 810 m. approximately in the center of the Kura valley, which is the subsidence between the Adjaro-Imeret'ian and the Trialet'ian ranges. The northernmost projection of the vast volcanic andesite and basalt area in the northern portion of the Anti-Caucasus reaches the Kura valley at Borzhomi, and extends a few kilometers further down the valley. As a health resort with mineral springs, Borzhomi was known as early as the 12th century, during the great flourishing of the Georgian kingdom. The alkaline springs rich in carbonic dioxide are of the same type as those of Vichy, with the possible difference that the Borzhomi water possesses a greater radioactivity.

At a distance of only 10 km. east-southeast of Borzhomi in the volcanic andesite and basalt area, mineral springs are found at the little health resort of Tsagveri (1032 m. above sea level); among them there is a cold,

●312 calcareous, ferrous spring. About 7 km. farther to the southeast at an elevation of 1680 m., the health resort of Bakuriani is situated, with alkaline sulphurous mineral springs of a temperature of 32° C. located in the area near the town of Ts'ikhis-Djvari ("fortress hill"). Thirteen kilometers southwest of Bakuriani, the extinct volcano of Ts'khra-Tskharo, 2850 m., is situated.

At a distance of about 12 km. due northwest of K'ut'aisi, on the upper course of the stream Gubis-Tskhali, the town of Tskhaltubo is situated at an elevation of 270 m., famous for its radioactive mineral springs. These springs have a composition similar to those of Wiesbaden and Teplice (Czechoslovakia), with temperatures of 24-39° C. Tskhaltubo always has had a great number of visitors.

At this point, this very brief survey of the Caucasian mineral springs can be concluded. With regard to Armenia, the mineral springs there have not acquired any particular fame because of the climatic conditions of the country, preventing the establishment of major health resorts. It might be added that in 1840, during the volcanic activity of Mt. Ararat, a number of hot springs were seen erupting in big bubbles from the bottom of the Araxes river. Mention may be made here of Djermuk (Dzhermuk; Armen Džermuk', "Warm Springs") and Dilizhan (Delizhan; Deližan), the latter being a climatic health resort.

Naphtha and Thermal Springs

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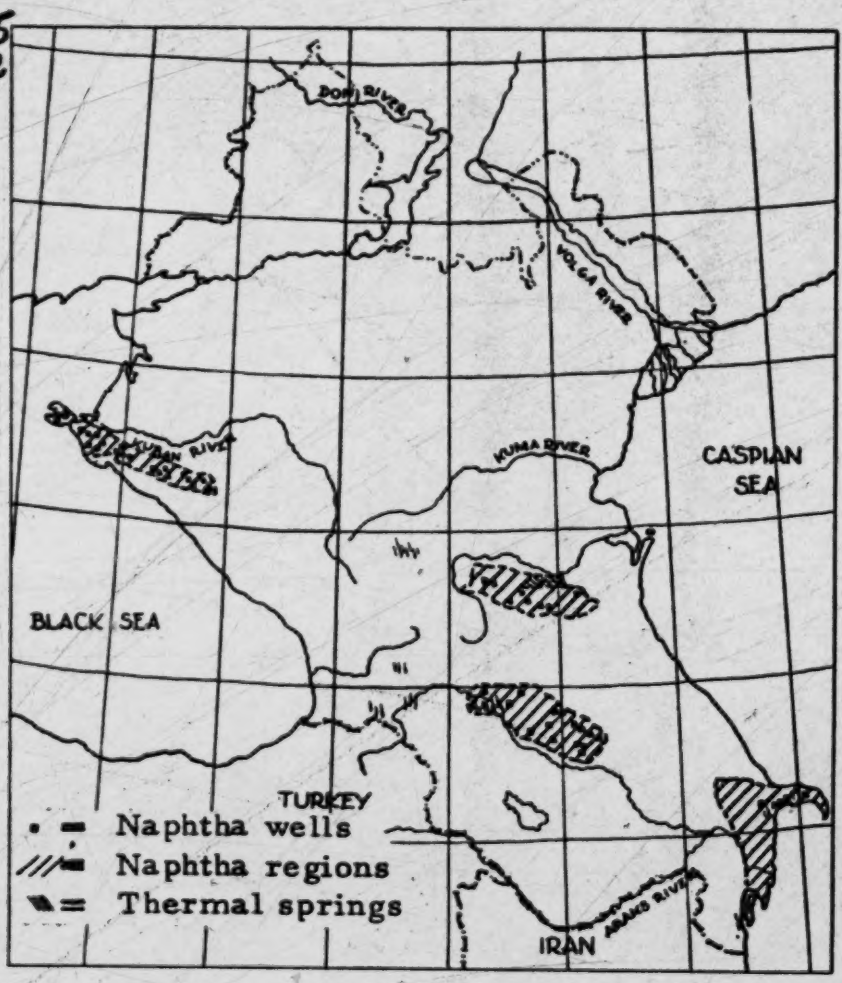

a^{-1}.4 Irrigation Canals

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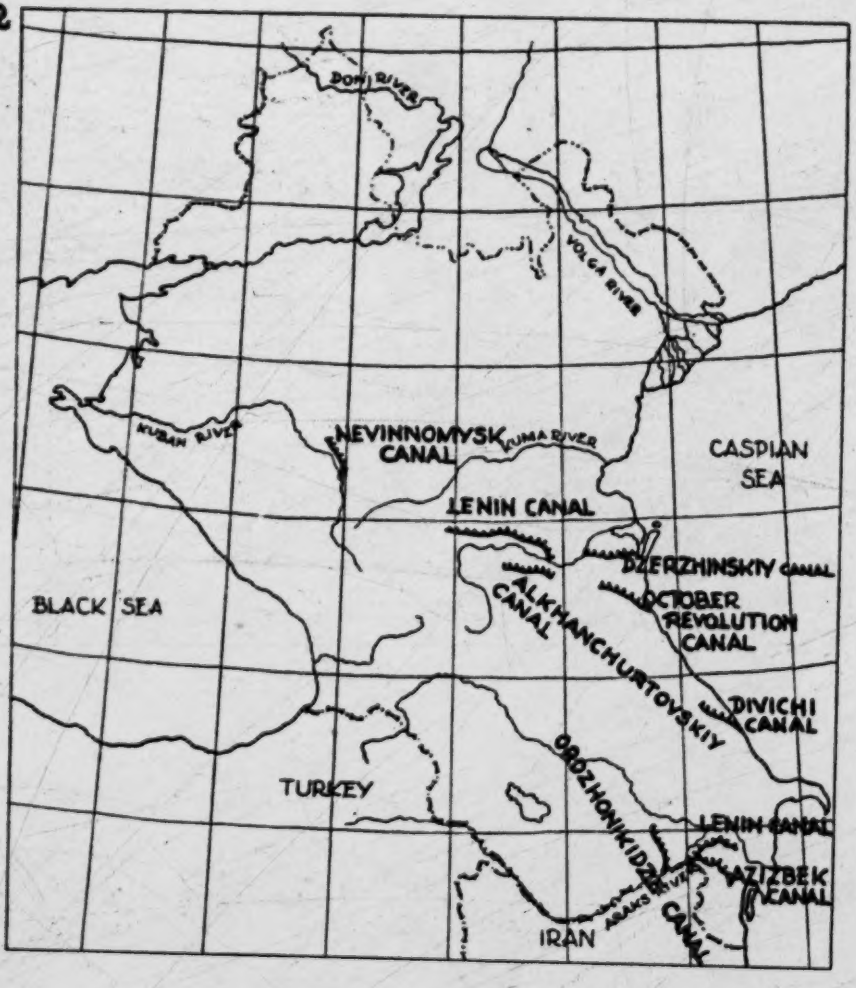

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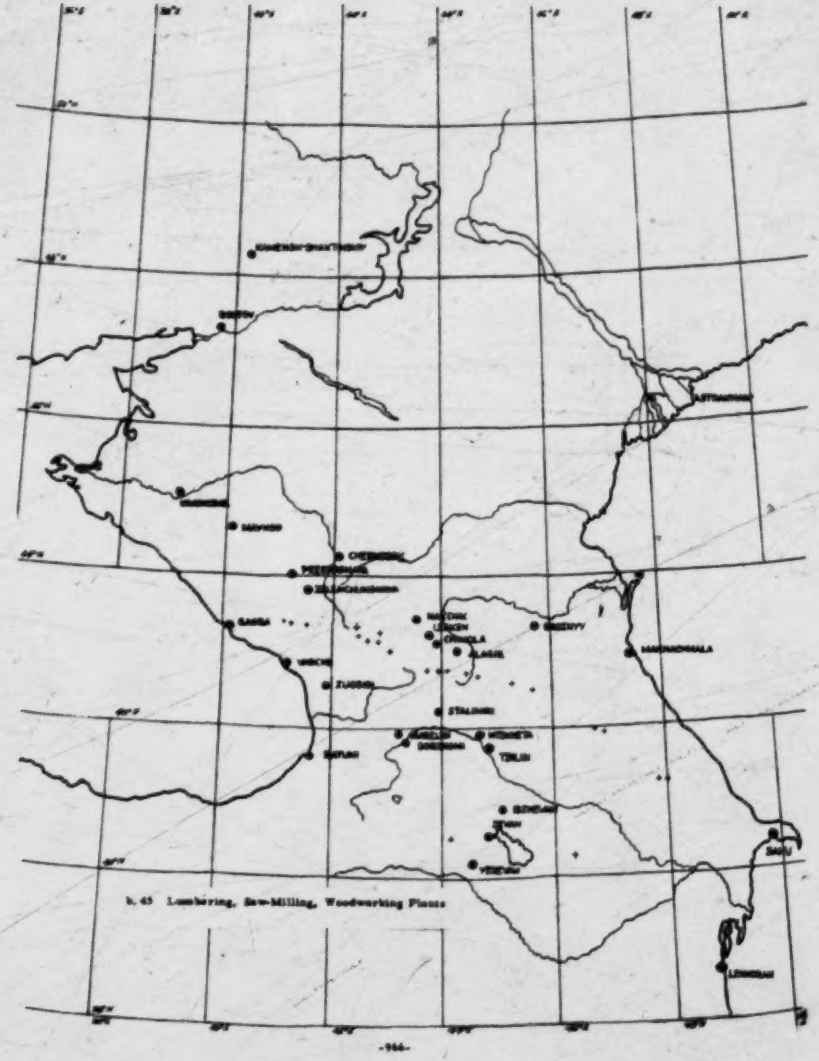

b. 45 Lumbering, Saw-Milling, Woodworking Plants

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